STUDIES OF AUSTRALIAN *HYDROBIOSELLA* TILLYARD (TRICHOPTERA: PHILOPOTAMIDAE): TWO NEW AUSTRALIAN SPECIES FROM NORTH QUEENSLAND

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Abstract

Two species of philopotamid caddis fly, *Hydrobiosella eminentia* sp. n. and *H. ferrata* sp. n. are newly described from Australia, based on features of the male genitalia. Both species are endemic to northeastern Queensland and share a unique feature in the genitalia, notably a pair of slender, elongate preanal processes situated basolaterally to segment X. On this basis they are assigned to a new species group within the genus *Hydrobiosella* Tillyard, the *H. eminentia* group. A key is provided for identification of all Australian *Hydrobiosella* species groups.

Introduction

The first Australian species in the genus *Hydrobiosella* Tillyard were recognised only in 1953 with the transfer of *H. michaelseni* (Ulmer, 1908) from *Dolophilus* McLachlan and description of *H. arcuata* Kimmins, *H. bispina* Kimmins, *H. cognata* Kimmins, *H. tasmanica* Mosely and *H. waddama* Mosely (in Mosely and Kimmins 1953). Subsequently, additional species were described: *H. letti* Korboot (1964); *H. armata* Jacquemart (1965); *H. anasina*, *H. cerula*, *H. corinna*, *H. orba* and *H. sagitta* Neboiss (1977), *H. amblyopia* Neboiss (1982); *H. anatolica*, *H. disrupta*, *H. otaria*, *H. propinqua*, *H. scalaris* and *H. tahunense* Neboiss (2003); and, most recently, ten new species in the *H. bispina* group: Cartwright (2010). Forty species of *Hydrobiosella* are known worldwide: from Australia (30 species), New Zealand (4 species: Morse 1999) and New Caledonia (6 species: Espeland and Johannson 2007).

Neboiss (1977) separated the Tasmanian species into three groups based primarily on male genitalia – the *H. corinna* group, the *H. tasmanica* group and *H. waddama*. Cartwright (2010) expanded this to include a key to the Australian mainland species and *H. bispina* species group. The description of two new species here brings to 32 the total number of Australian species of *Hydrobiosella*. The Australian mainland species in the *H. waddama* group are currently being reviewed (Cartwright in prep.).

In this taxonomic paper a new species group, the *H. eminentia* group, is proposed to incorporate two new species from northern Queensland described below: *H. eminentia* and *H. ferrata*. Males of the two species in the *Hydrobiosella eminentia* group are the only Australian mainland species of *Hydrobiosella* known to have preanal appendages. These appendages in the *H. eminentia* group are more slender and elongate than similar 'appendages' reported for Tasmanian (notably the *H.corinna* and *H. tasmanica* groups), New Zealand (including the type species, *H. stenocerca* Tillyard) and New Caledonian species (including *H. mouensis* Espeland and Johanson). *Hydrobiosella mouensis* has a pair of elongate tubular processes attached

basally on segment ten with flat superior appendages present at lateral part of tubular processes (Espeland and Johanson 2007).

In this taxonomic revision of the Australian *Hydrobiosella eminentia* group only three male specimens were examined and referred to two species, *H. eminentia* and *H. ferrata*. *Hydrobiosella eminentia* was listed in the checklist of Walker *et al.* (1995) as *Hydrobiosella* sp. nov. PT-1039. The two new species in the *Hydrobiosella eminentia* group are from northeastern Queensland (latitudinal range 12°44'–17°16'S), within the Torresian region. Two species within the *H. bispina* group, *H. unispina* Cartwright and *H. dugerang* Cartwright, were also recorded from north Queensland (Cartwright 2010), in contrast to the more southern Bassian distributions of the other 28 described *Hydrobiosella* species (SE Queensland, New South Wales, Victoria, Tasmania and southwestern Australia). This mainly Bassian Australian distribution, together with a distribution of the genus that is otherwise restricted to New Zealand and New Caledonia, is generally suggestive of a 'southern' origin. *Hydrobiosella ferrata* is the most northerly species of *Hydrobiosella* known, recorded from a latitude of 12°44' S, *H. eminentia* from 17°16'S and the six New Caledonian species are reported further south at between 20°24'–25°5' S (Espeland and Johannson 2007).

Ross (1956) recognised *Hydrobiosella* as a subgenus of *Sortosa* Navas and postulated an original ancestral form that gave rise to two lines, a New Caledonian – New Zealand lineage (with small or reduced cerci (= preanal appendages)) and one in Australia (without cerci but with basal ridge or process of ninth tergite). The presence of preanal appendages in the two species described here from far northern Queensland, as well as in all New Caledonian, New Zealand and some Tasmanian species (*H. corinna* group), suggests other possibilities. When all Australian *Hydrobiosella* species groups have been revised then relationships of the Australian groups with species in New Zealand and New Caledonia can then be properly assessed.

Methods and abbreviations

Among *Hydrobiosella* species, size and body and wing colour can be useful taxonomic characters but are variable. Colour can be a useful character in freshly preserved material but, with time, it often fades in alcohol. The three *H. eminentia* group specimens examined in this study were stored in alcohol for 30 years or more. The material studied was on loan from Museum Victoria and made available by Dr Arturs Neboiss. All specimens, including types, mentioned in the text are lodged in the Museum Victoria, Melbourne (NMV).

Males of each species are most readily distinguished by genitalic features but often require clearing of the abdomen in potassium hydroxide.

Figured specimens are identified by the notebook numbers of Dr Arturs Neboiss (prefix PT-) or the author (prefix CT-). Terminology used generally

follows that of Neboiss (1977, 1982), Blahnik (2005) and Holzenthal *et al.* (2007). Abbreviations for genitalic parts are indicated on selected figures. Typically, setae or spines are illustrated only on the right side of the figure (as viewed) to enable a better view of the underlying structures. Length/width measurements generally refer to the maximum length divided by the maximum width.

Previous authors have used a confusing variety of names for the same or similar structures *e.g.* preanal appendages (homologous/or analogous structures to some or all of the following – cerci, shoulder-like projection or basal ridge or process of tenth tergite in Ross 1956; = superior appendages in Neboiss 1977, Henderson 1983; = superior appendages or tubular processes of Espeland and Johanson 2007; = preanal appendages in Holzenthal *et al.* 2007, Cartwright 2010).

Key to males of known Australian groups (or ungrouped species) of *Hydrobiosella* Tillyard (updated after Cartwright 2010)

1 Phallus without pair of parameres (Figs 2-3, 5-6; Neboiss 1986, figs pp 99, *H. amblyopia*; 101, *H. tasmanica*; 102, *H. corinna*) 2

– Phallus with pair of parameres (Cartwright 2010, figs 2-3; Neboiss 1986, figs pp 99, *H. michaelseni*, *H. waddama*; 101, *H. letti*; 102, *H. bispina*) 5

2 Preanal appendages present, usually small (Figs 2-3, 5-6; Neboiss 1977, figs 204-205, 216-217; Neboiss 1986, figs pp 101, *H. tasmanica*; 102, *H. corinna*; Neboiss 2003, figs 8a–h) 3

– Preanal appendages absent (Neboiss 1986, figs pp 99, *H. amblyopia*; 101; *H. tasmanica*) 4

3 Preanal appendages relatively slender, elongate and 'unattached' to segment IX (Figs 2-3, 5-6); NE-Qld ..... *Hydrobiosella eminentia* group

– Preanal appendages often short and bulbous or 'attached' to segment IX (Neboiss, 1977, figs 204-211; Neboiss 1986, figs p. 102, *H. corinna*; Neboiss, 2003, figs 8A-H); Tas ..... *Hydrobiosella corinna* group

4 Phallus apically with downward projecting spine(s) (Neboiss 1977, figs 216-221, 225-226; Neboiss 1986, figs p. 101, *H. armata*, *H. tasmanica*; Neboiss 2003, figs 10A-G, 11A-G, 12A-F); Tas .... *Hydrobiosella tasmanica* group

– Phallus apically without downward projecting spine(s) (Neboiss 1982, fig. 12; Neboiss 1986, figs p. 99 *H. amblyopia*); S-WA .... *H. amblyopia* (ungrouped)

5 Inferior appendages with harpago with dark row of setae forming fringe along ventral margin (Cartwright 2010, figs 3, 6; Neboiss 1986, figs pp

102, *H. bispina*; 103, *H. arcuata*); E-Vic, E-NSW, E-Qld .... *Hydrobiosella bispina* group

– Inferior appendages with harpago without dark row of setae forming fringe along ventral margin (Neboiss 1986, figs pp 99, *H. michaelseni*, *H. waddama*; 101, *H. letti*) 6

6 Parameres elongate and sinusoidal, attached ventrally to base of phallus (Cartwright in prep., figs 2-3, 5-6; Neboiss 1977, fig. 233; Neboiss 1986, figs p. 99, *H. waddama*; Neboiss 2003, figs 12g-h); Tas, SE Aust. ..... *Hydrobiosella waddama* group

– Parameres not elongate and sinusoidal, not attached ventrally to base of phallus (Neboiss 1982, figs 9-10; Neboiss 1986, figs pp 99, *H. michaelseni*; 101, *H. letti*) 7

7 Parameres curved strongly and crossed (Neboiss 1982, figs 9-10; Neboiss 1986, figs p. 99; *H. michaelseni*); S-WA .... *Hydrobiosella michaelseni* (Ulmer) (unplaced to group)

– Parameres not curved strongly and crossed (Neboiss 1986, figs p. 101, *H. letti*); CE-NSW ..... *Hydrobiosella letti* Korboot (unplaced to group)

Systematics

Hydrobiosella Tillyard

Hydrobiosella Tillyard 1924: 288; Mosely and Kimmins 1953: 387; Neboiss 1977: 45; Neboiss 2003: 55; Espeland and Johanson 2007: 92.

Type species: *Hydrobiosella stenocerca* Tillyard, by monotypy.

Hydrobiosella eminentia group

Diagnosis. The diagnostic characters of the males of this group of two species are the obvious pair of slender and elongate preanal processes situated baso-laterally to segment X and the relatively simple phallus which lacks associated spines or parameres.

Description. Male. Wings light brown to brown, medium-sized. Forewing length, males: 4.3–5.2 mm; forewing length about 3 times width, wing venation (Fig. 1) similar to the type species *H. stenocerca* (Mosely and Kimmins 1953, fig 265a) and *H. waddama* (Mosely and Kimmins 1953, fig 269a), R1 simple, forks 1, 2, 3, 4 and 5 present; forks 1 and 2 sessile; fork 2 with nygma, length about 1.3–1.4 times length fork 1; fork 3 shorter, length 0.6–0.7 times length fork 2, fork length ranging from between 1.7–1.8 times length footstalk, fork 4 similar in length to fork 3, length fork about three times length footstalk; fork 5 very long, length about 1.7 times length fork 4. Hind wing length about 2.3–2.7 times width, with forks 1, 2, 3 and 5 present; forks 1 and 2 sessile, fork 2 with nygma, length about 1.5 times length fork 1; fork 3 shorter, about 0.6–0.7 times length fork 2, fork 3 longer than footstalk,

length fork ranging between 1.7–1.8 times length footstalk; fork 5 very long, length between 1.9–2 times length fork 3; discoidal cell closed, length between 3.7–4.8 times maximum width; with two or possibly three longer anal veins (Fig. 1).

Male. Sternite IX either with a small shallow notch (Fig. 4) or a medial knob on distal margin (Fig. 7). Segment X with a simple process, sclerotised dorsally; preanal appendages relatively elongate and slender, situated baso-laterally to segment X. Phallus generally tube-like, without any obvious spines or parameres. Inferior appendages 2-segmented, basal segment robust, slightly longer or similar in length to harpago, which is more slender and has a small field of dark spines apically (Figs 2, 3, 5, 6).

Female and larvae. Unknown.

Key to males of species of the Australian *Hydrobiosella eminentia* group

1 Segment X long and slender (Figs 2-3), in dorsal view, length about 3 times width (Fig. 2); sternite IX with a small, shallow notch medially on distal margin (Fig. 4) ..... *H. eminentia* sp. n.

– Segment X not long and slender (Figs 5-6), in dorsal view, robust, length about 1.5 times width (Fig. 6); sternite IX with a small knob medially on distal margin (Fig. 7) ..... *H. ferrata* sp. n.

Hydrobiosella eminentia sp. n.

(Figs 1-4)

Types. Holotype ♂: QUEENSLAND, Mt Bartle Frere, 0.5 km N of S peak (about 17°16'S, 145°54'E), 1500 m, 6-8.xi.1981, Earthwatch-QM (NMV, T- 21250). *Paratype* ♂ (specimen PT-1039 figured), collected with holotype (NMV).

Diagnosis. Hydrobiosella eminentia can be separated from *H. ferrata* by the long and slender segment X and small shallow notch medially on distal margin sternite IX.

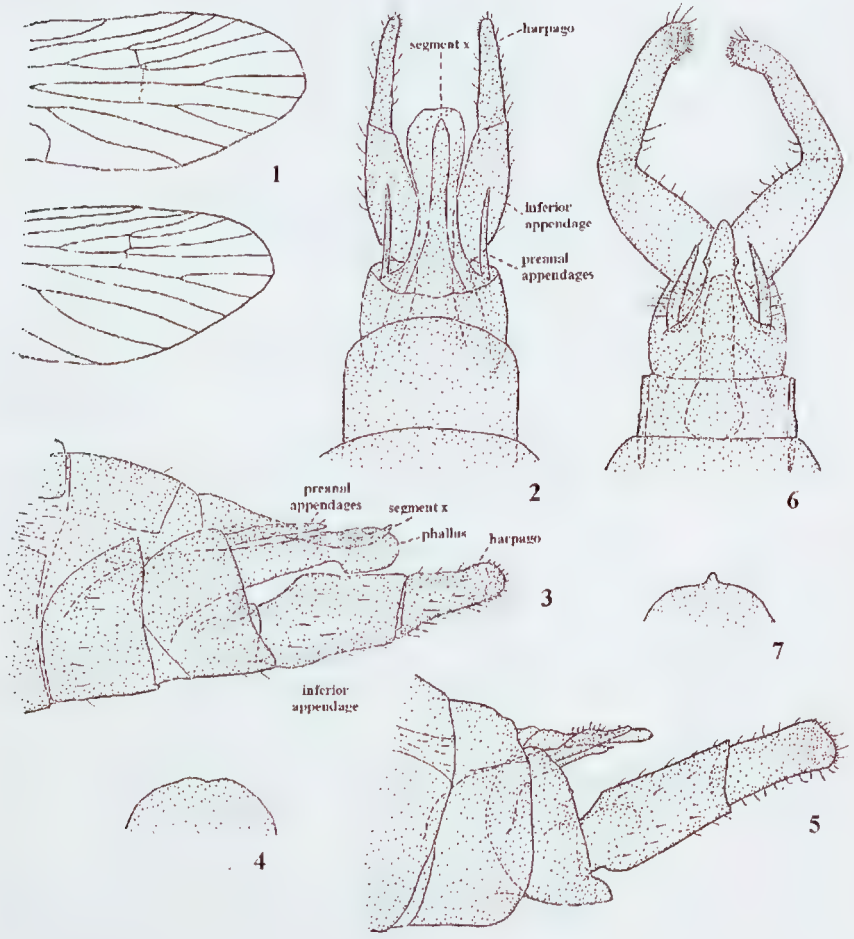
Description. Wings (Fig. 1), similar to *H. stenocerca* (Mosely and Kimmins 1953, fig. 265a) and *H. waddama* (Mosely and Kimmins 1953, fig. 269a). Length of forewing: male 5.2 mm.

Male. Sternite IX with a small shallow notch on ventromedial-distal margin (Fig. 4). Segment X mainly sclerotised, broadest basally, long and slender distally; in dorsal view, length about 3 times width (Fig. 2); in lateral view slender, slightly upcurved distally. Preanal appendages slender, elongate, situated baso-laterally to segment X; length about 0.6 times length of tergum X (Fig. 3). Phallus generally tube-like, slightly bulbous apically (Figs 2-3). Inferior appendages 2-segmented: in lateral view, basal segment sub-rectangular, length about 1.7 times width and about 1.3 times length of harpago; harpago slightly more slender, length about twice width, tapered slightly distally (Fig. 3).

Female. Unknown.

Etymology. Eminentia - Latin for projection, prominence, in reference to the preanal appendages.

Remarks. *Hydrobiosella eminentia* is probably a rare and restricted species, since, despite considerable collecting in the Wet Tropics of northeastern Queensland, it is known only from the type locality at Mt Bartle Frere.



Figs 1-7. *Hydrobiosella eminentia group* species. (1-4) *Hydrobiosella eminentia* sp. n.: (1) wings, apical section of forewing and hind wing; (2-4) male genitalia in dorsal, lateral and part ventral views; (2) dorsal; (3) lateral; (4) ventral, medioventral-distal margin of segment IX. (5-7) *Hydrobiosella ferrata* sp. n.: male genitalia in dorsal, lateral and part ventral views; (5) dorsal; (6) lateral; (7) ventral, medioventral-distal margin of segment IX.

Hydrobiosella ferrata sp. n.

(Figs 5-7)

Type. Holotype ♂ (specimen CT-562 figured): QUEENSLAND, Mt Tozer, Iron Range (about 12°44'S, 143°12'E), 300 m, 30.iv.1973, S.R. Monteith (NMV, T-21252).

Diagnosis. Hydrobiosella ferrata can be separated from *H. eminentia* by the robust segment X, dorsal view, and the ventromedial-distal margin of sternite IX produced in a small knob.

Description. Wings similar to *H. eminentia* (Fig. 1), length of forewing: male 4.3 mm.

Male. Sternite IX with a small knob on medio-distal margin (Fig. 7). Segment X mainly sclerotised, broadest basally, robust distally; in dorsal view, length about 1.5 times width; in lateral view, slender; preanal appendages slender, elongate, situated baso-laterally to segment X (Figs 5, 6). Phallus generally tube-like with a minute spine apically (Fig. 6). Inferior appendages 2-segmented: in lateral view, basal segment robust, length about twice width, sub-rectangular; harpago slightly more slender, sub-rectangular, inflexed apically (Fig. 6).

Female. Unknown.

Etymology. Ferrata – Latin for 'relating to iron', in reference to the type locality of Iron Range.

Remarks. Only a single male specimen of this probably rare and restricted species of *Hydrobiosella* has been collected from the Iron Range on Cape York Peninsula, northeastern Queensland (Latitude 12°44'S).

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